

Applicant: Armin MERZ et al.  
Docket No. R.307341  
Preliminary Amdt.

**AMENDMENTS TO THE SPECIFICATION:**

Page 1, please add the following new paragraphs before paragraph [0001]:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 USC 371 application of PCT/DE 2004/002584 filed on November 23, 2004.

[0000.6] BACKGROUND OF THE INVENTION

Please replace paragraph [0001] with the following amended paragraph:

[0001] **Prior Art**      **Field of the Invention**

Please replace paragraph [0002] with the following amended paragraph:

[0002] The invention is directed to an improved based on a high-pressure pump, in particular for a fuel injection system of an internal combustion engine, as generically defined by the preamble to claim 1.

Please add the following new paragraph after paragraph [0002]:

[0002.5] Description of the Prior Art

Please replace paragraph [0003] with the following amended paragraph:

[0003] A high-pressure pump of this kind is known from DE 199 07 311 A1. This high-pressure pump has a housing and several pump elements situated in the housing. Each of the pump elements has a pump piston that is set into a stroke motion by a drive shaft of the high-pressure pump. The pump piston is guided in a sealed fashion in a cylinder bore of housing part of the high-pressure pump and delimits a pumping chamber in the cylinder bore. The pump piston is supported against the drive shaft by means of a support element in the form of a tappet. A prestressed return spring acts on the pump piston in the direction of the tappet

and acts on the tappet in the direction of the drive shaft. A roller is supported in the tappet in rolling fashion and supports the tappet against a cam of the drive shaft. The tappet is guided so that it can slide in a bore contained in another housing part of the high-pressure pump separate from the housing part containing the cylinder bore; the bore and the tappet have a significantly larger diameter than the cylinder bore. A disadvantage of this known high-pressure pump is that the cylinder bore in which the pump piston is guided and the bore in which the tappet is guided are contained in separate housing parts so that assuring an exact alignment of the cylinder bore and the bore for the tappet requires complex centering measures to align the housing parts in relation to each other. In addition, because of its large diameter, the tappet is heavy, which in turn requires a very rigid and therefore heavy return spring in order to prevent the tappet from lifting up from the drive shaft at high speeds, which results in the high-pressure pump being heavy as a whole.

Page 2, please replace paragraph [0004] with the following amended paragraph:

[0004] **Advantages of the Invention**

**SUMMARY AND ADVANTAGES OF THE INVENTION**

Please replace paragraph [0005] with the following amended paragraph:

[0005] The high-pressure pump according to the invention, ~~with the defining characteristics of claim 1~~, has the advantage over the prior art that the cylinder bore for the pump piston and the receptacle for the support element are contained in the same housing part, thus requiring no complex centering measures during assembly of the high-pressure pump. In addition, the support element can be compactly embodied, which allows it to be light in weight, and the

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return spring can be embodied with a correspondingly low rigidity, as a result of which the weight of the high-pressure pump can be kept to a minimum.

Please replace paragraph [0006] with the following amended paragraph:

[0006] Advantageous embodiments and modifications of the high-pressure pump according to the present invention are disclosed ~~in the dependent claims~~. The receptacle embodied according to ~~claim 3 is~~ **one embodiment is especially** simple to manufacture.

Please replace paragraph [0007] with the following amended paragraph:

[0007] Drawings      **BRIEF DESCRIPTION OF THE DRAWINGS**

Please replace paragraph [0008] with the following amended paragraph:

[0008] Two exemplary embodiments of the invention are **described in detail herein below, with reference to the drawings, in which:** ~~shown in the drawings and will be explained in detail in the subsequent description.~~

Page 3, please replace paragraph [0009] with the following amended paragraph:

[0009] Fig. 1 shows a longitudinal section through a high-pressure pump for a fuel injection system of an internal combustion engine[[,]] **according to the present invention;**

Please replace paragraph [0014] with the following amended paragraph:

[0014]      ~~Description of the Exemplary Embodiments~~

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Page 4, please replace paragraph [0016] with the following amended paragraph:

[0016] In a region between the two bearing points, the drive shaft 12 has at least one cam 16; the cam 16 can also be embodied in the form of a multiple cam. The high-pressure pump has at least one or more pump elements 18 contained in the housing 10, each connected to a pump piston 20 that the cam 16 of the drive shaft 12 sets into a stroke motion in an at least approximately radial direction in relation to the rotation axis 13 of the drive shaft 12. In the region of each pump element 18, a housing part 22 is provided, which is connected to the base body 14 and is embodied in the form of a cylinder head. The housing part 22 has a flange 24 resting against an outside of the base body 14 and an at least approximately cylindrical extension 26 whose diameter is smaller than that of the flange 24 and protrudes through an opening 15 in the base body 14 toward the drive shaft 12. The pump piston 20 is guided in a sealed fashion in the housing part 22, inside a cylinder bore 28 contained in the extension 26 and delimits a pumping chamber 30 in the cylinder bore 28 with its end surface oriented away from the drive shaft 12. The cylinder bore 28 can extend into the flange 24 that contains the pumping chamber 30. A fuel supply conduit 32 extending in the housing 10 connects the pumping chamber 30 to a fuel inlet, for example from a fuel supply pump. An inlet valve 34 that opens into the pumping chamber 30 is situated at the junction point of the fuel inlet conduit 32 and the pumping chamber 30. The pumping chamber 30 is also connected via a fuel outlet conduit 36 extending in the housing 10 to an outlet that is connected, for example, to a high-pressure reservoir 110. The high-pressure reservoir 110 is connected to one or preferably several injectors 120 that are provided at the cylinders of the internal combustion engine and inject the fuel into the cylinders of the engine. An outlet

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valve 38 that opens out from the pumping chamber 30 is situated at the junction point of the fuel outlet conduit 36 and the pumping chamber 30.

Page 5, please replace paragraph [0018] with the following amended paragraph:

[0018] Figs. 2 and 3 show the high-pressure pump according to a first exemplary embodiment. The receptacle 46 for the support element 40 is embodied here in the form of a slot in the extension 26 of the housing part 22, which slot is connected to the cylinder bore 28 and extends to the end surface of the extension 26 oriented toward the drive shaft 12. The slot 46 is delimited by two walls 48 of the extension 26 extending at least approximately parallel to each other. The support element 40 is embodied as at least approximately rectangular in cross-section and is situated between the two walls 48 with a slight amount of play. The surfaces of the walls [[46]] 48 oriented toward the support element 40 and/or the surfaces 41 of the support element 40 oriented toward the walls [[46]] 48 are preferably machined in such a way that they are flat and have a low degree of surface roughness, for example the surfaces are ground. The support element 40 is guided so that it can slide between the parallel walls 48, in the direction of the longitudinal axis 21 of the pump piston 20, but cannot rotate in relation to the longitudinal axis 21.

Page 8, please add the following new paragraph after paragraph [0022]:

[0023] The foregoing relates to a preferred exemplary embodiment of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.